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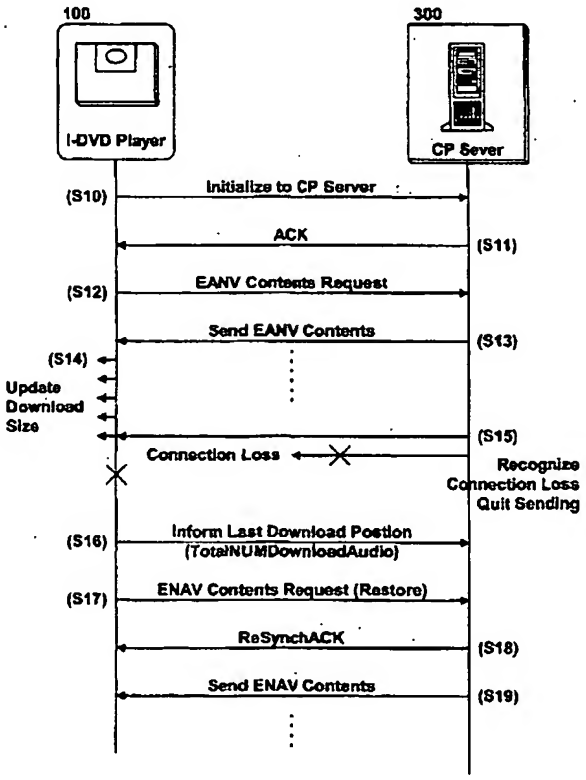
(54) Title: METHOD FOR REPRODUCING CONTENTS INFORMATION IN INTERACTIVE OPTICAL DISC DEVICE AND METHOD FOR PROVIDING CONTENTS INFORMATION IN CONTENTS PROVIDER SERVER



(57) Abstract: Disclosed herein are a method for reproducing contents information in an interactive optical disc device and a method for providing contents information in a contents provider server. The interactive optical disc device is connected with the contents provider server via the Internet to receive a variety of contents information provided from the contents provider server. When the sending of the contents information from the contents provider server to the interactive optical disc device is suspended or delayed due to a network connection loss on the Internet or an insufficient storage capacity of a buffer memory in the interactive optical disc device, contents information re-sent from the contents provider server and a data stream read from an interactive DVD are re-synchronized and reproduced. Therefore, a user of the interactive optical disc device can normally watch more various contents information.

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DESCRIPTION

METHOD FOR REPRODUCING CONTENTS INFORMATION IN INTERACTIVE OPTICAL DISC DEVICE AND METHOD FOR PROVIDING CONTENTS INFORMATION IN CONTENTS PROVIDER SERVER

1. Technical Field

The present invention relates to a method for reproducing contents information in an interactive optical disc device and a method for providing contents information in a contents provider (CP) server, wherein a variety of contents information relevant to A/V data of an optical disc, such as an interactive digital versatile disc (I-DVD), is provided from the CP server over the Internet and then reproduced in the interactive optical disc device.

2. Background Art

Recently, high-density optical discs capable of storing mass digital data, for example, DVDs, have become widespread. These DVDs have been commercially available as large-capacity storage media capable of storing high-quality video data as well as digital audio data.

Such a DVD includes a navigation data recording area for recording navigation data necessary for control of reproduction of video data, and a data stream recording area for recording a digital data stream such as the video data.

Therefore, a general DVD player is adapted to, if the DVD is loaded therein, read the navigation data recorded in the navigation data recording area, store the read navigation data in a memory thereof, and then perform a DVD reproduction operation

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using the stored navigation data to read and reproduce the video data recorded in the data stream recording area.

As a result, a user of the DVD player can not only watch the high-quality video data recorded on the DVD, but also select and use a variety of functions provided from the DVD.

Meanwhile, a concrete scheme for an interactive digital versatile disc (I-DVD) capable of additionally recording detailed information relevant to A/V data to be reproduced therefrom, as various contents information such as an 'html file', and reproducing the recorded contents information through an interaction with a user is recently under discussion among the associated companies. If this I-DVD is commercially available, the user will be able to readily retrieve the various contents information relevant to the A/V data.

Under discussion is another scheme able to, while reproducing the A/V data and contents information recorded on the I-DVD, receive other various contents information from a contents provider server over the Internet and reproduce the received contents information synchronously with the A/V data being reproduced. In this scheme, however, the sending of the contents information from the contents provider server may be suspended or delayed due to a network connection loss or an insufficient storage capacity of a buffer memory in an interactive optical disc device. In this case, a re-synchronization must be performed with respect to the contents information and A/V data. However, there is currently no concrete scheme for the re-synchronization and there is thus an urgent need for the solution.

3. Disclosure of Invention

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a method for reproducing contents information in an

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interactive optical disc device and a method for providing contents information in a contents provider server, wherein the interactive optical disc device is connected with the contents provider server via the Internet to receive a variety of contents information provided from the contents provider server and, if the sending of the contents information from the contents provider server to the interactive optical disc device is suspended or delayed, contents information re-sent from the contents provider server and a data stream read from an interactive DVD are re-synchronized and reproduced.

In accordance with one aspect of the present invention, the above and other objects can be accomplished by the provision of a method for producing contents information in an interactive optical disc device, comprising the steps of: a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet; b) if the sending of said contents information from said contents provider server is suspended or delayed, generating a command for requesting re-sending of specific contents information, based upon information about a size of said downloaded contents information, and sending the generated command to said contents provider server; and c) reproducing said specific contents information re-sent from said contents provider server in response to said command together with data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

In accordance with another aspect of the present invention, there is provided a method for producing contents information in an interactive optical disc device, comprising the steps of: a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet; b) if the

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sending of said contents information from said contents provider server is suspended or delayed, pausing a data reproducing operation of said interactive optical disc for a predetermined period of time and determining whether there is contents information received over said Internet; and c) if there is contents information received over said Internet, re-synchronizing and reproducing the received contents information and data read from said interactive optical disc.

In accordance with another aspect of the present invention, there is provided a method for producing contents information in an interactive optical disc device, comprising the steps of: a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet; b) if the sending of said contents information from said contents provider server is suspended or delayed, generating a command for requesting re-sending of specific contents information, based upon a counted contents information synchronization value, and sending the generated command to said contents provider server; and c) reproducing said specific contents information re-sent from said contents provider server in response to said command together with data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

In accordance with another aspect of the present invention, there is provided a method for producing contents information in an interactive optical disc device, comprising the steps of: a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet; b) if the sending of said contents information from said contents provider server is suspended or delayed, generating a command for requesting re-sending of specific contents information, based

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upon offset information of said data read from said interactive optical disc, and sending the generated command to said contents provider server; and c) after a predetermined period of time has elapsed, reproducing said specific contents information re-sent from said contents provider server in response to said command together with data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

In accordance with another aspect of the present invention, there is provided a method for providing contents information in a contents provider server, comprising the steps of: a) sequentially sending contents information whose sending is requested by an interactive optical disc device connected via the Internet; b) if the sending of said requested contents information is suspended or delayed, receiving a command, while including a parameter which is information regarding specific contents information, for requesting re-sending of said specific contents information, from said interactive optical disc device; and c) re-sending said specific contents information to said interactive optical disc device in response to said command.

4. Brief Description of Drawings

The accompanying drawings, which are included to provide a further understanding of the invention, illustrate the preferred embodiments of the invention, and together with the description, serve to explain the principles of the present invention.

Fig. 1 is a block diagram showing a connection between an interactive optical disc device and a contents provider server to which the present invention is applied;

Fig. 2 is a conceptual diagram illustrating a data reproduction operation of the interactive optical disc device to which the present invention is applied;

Fig. 3 is a flow chart illustrating a procedure of sending

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and receiving data between the interactive optical disc device and the contents provider server in accordance with a first embodiment of the present invention;

Fig. 4 is a flow chart illustrating a procedure of sending and receiving data between the interactive optical disc device and the contents provider server in accordance with a second embodiment of the present invention;

Fig. 5 is a flow chart illustrating a procedure of sending and receiving data between the interactive optical disc device and the contents provider server in accordance with a third embodiment of the present invention; and

Fig. 6 is a flow chart illustrating a procedure of sending and receiving data between the interactive optical disc device and the contents provider server in accordance with a fourth embodiment of the present invention.

Features, elements, and aspects of the invention that are referenced by the same numerals in different figures represent the same, equivalent, or similar features, elements, or aspects in accordance with one or more embodiments.

5. Modes for Carrying out the Invention

Fig. 1 shows a connection between an interactive optical disc device and a contents provider server to which the present invention is applied. As shown in this drawing, the interactive optical disc device, for example, an interactive DVD (I-DVD) player 100, comprises an optical pickup 11, I-DVD system 12, microcomputer 13, buffer memory 14 and Internet interface 15.

The I-DVD system 12 is adapted to synchronize and reproduce A/V data and contents information read from an I-DVD 10 and the Internet interface 15 is connected with the contents provider (CP) server, which is denoted by the reference numeral 300, via the Internet 200 by virtue of an interaction between the microcomputer 13 and an enhanced navigator (not shown) in the I-DVD system 12,

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as shown in Fig. 1.

The buffer memory 14 is adapted to download and temporarily store a variety of contents information, for example, a variety of ENAV (Enhanced Navigation) contents data such as audio data relevant to the video data read from the I-DVD 10, provided from the CP server 300. The buffer memory 14 can be logically divided into a first buffer Buffer 1 and a second buffer Buffer 2.

The enhanced navigator in the I-DVD system 12 functions to, while reproducing an A/V stream and ENAV contents information read from the I-DVD 10, reproduce other ENAV contents information provided from the CP server 300 synchronously with the A/V stream, as shown in Fig. 2.

Therefore, a user of the I-DVD player 100 can watch the ENAV contents information, for example, audio data, provided from the CP server 300 along with the A/V stream and/or ENAV contents information read from the I-DVD 10.

Meanwhile, the provision of the ENAV contents information from the CP server 300, such as the audio data, may be suspended or delayed due to a network connection loss on the Internet or an insufficient storage capacity of the buffer memory in the I-DVD player. In this case, the enhanced navigator in the I-DVD system 12 performs a series of operations to re-synchronize the data stream read from the I-DVD 10 and the audio data provided from the CP server 300, as will hereinafter be described in detail.

Fig. 3 is a flow chart illustrating a procedure of sending and receiving data between the interactive optical disc device and the contents provider server in accordance with a first embodiment of the present invention. For example, upon occurrence of an event based on a script or a user's request while reproducing an A/V stream from the I-DVD 10 loaded in the device as stated previously, the I-DVD player 100 initializes an Internet connection with the CP server 300 (S10), and the CP server 300

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performs a corresponding operation (S11).

Thereafter, the I-DVD player 100 generates a command for requesting sending of ENAV contents information, such as audio data corresponding to the A/V stream being currently reproduced, and sends the generated command to the CP server 300 (S12).

In response to the command from the I-DVD player 100, the CP server 300 retrieves the requested audio data from a database (not shown) and then sends it as ENAV contents information to the I-DVD player 100 (S13). The I-DVD player 100 downloads and temporarily stores the audio data provided as the ENAV contents information from the CP server 300 into the buffer memory 14, and then reproduces the stored audio data together with video data read from the I-DVD 10 while synchronizing it with the video data.

Meanwhile, the I-DVD player 100 continuously updates the size of audio data, or ENAV contents information, downloaded into the buffer memory 14 (S14). Also, the CP server 300 has an error processing function prepared against network connection losses, such as clients' access failures on the Internet and time-out, and listens to clients' accesses.

If a network connection loss occurs, the CP server 300 quits the sending of the ENAV contents information (S15). If the sending of the ENAV contents information is quitted, the I-DVD player 100 checks the last download position of the buffer memory 14, for example, information 'TotalNumDownloadAudio' indicative of an offset of the audio data downloaded from the CP server 300 and stored in the buffer memory 14, and then sends the checked result to the CP server 300 (S16).

Thereafter, the I-DVD player 100 generates a command for requesting re-sending of the ENAV contents information, for example, a command 'Restore' for requesting re-sending of ENAV contents information subsequent to the offset of the audio data downloaded into the buffer memory 14, and then sends the generated command to the CP server 300 (S17).

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Meanwhile, the CP server 300 recognizes a recording position of audio data at a point of time that the ENAV contents information sending is quitted, with reference to the information 'TotalNumDownloadAudio' received through the above procedure, and, upon receiving the command 'Restore', sends a corresponding command 'ReSynchACK' to the I-DVD player 100 (S18), reads ENAV contents information at the recognized recoding position and re-sends the read ENAV contents information to the I-DVD player 100 (S19). The I-DVD player 100 recognizes only ENAV contents information just after the command 'ReSynchACK' sending, as normal data, so it can establish an accurate re-synchronization between data read from the I-DVD 10 and the contents information. This series of operations S15-S19 are repeated each time a network connection loss occurs.

Therefore, even in the case where the sending of ENAV contents information from the CP server is suspended or delayed due to a network connection loss on the Internet or an insufficient storage capacity of the buffer memory in the I-DVD player, the ENAV contents information can be normally re-sent/received through an interaction between the I-DVD player and the CP server as stated above, so that it can be normally reproduced along with data read from the I-DVD while being re-synchronized with the read data.

Fig. 4 is a flow chart illustrating a procedure of sending and receiving data between the interactive optical disc device and the contents provider server in accordance with a fifth embodiment of the present invention. As stated previously, the I-DVD player 100 initializes an Internet connection with the CP server 300, and the CP server 300 performs a corresponding operation.

Thereafter, the I-DVD player 100 generates a command for requesting sending of ENAV contents information, such as audio data corresponding to an A/V stream being currently reproduced,

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and outputs the generated command to the CP server 300.

In response to the command from the I-DVD player 100, the CP server 300 retrieves the requested audio data from a database and then sends it as ENAV contents information to the I-DVD player 100.

Therefore, the I-DVD player 100 synchronizes and reproduces the A/V stream and/or contents information read from the I-DVD 10 and the ENAV contents information, or audio data, downloaded from the CP server 300 and temporarily stored in the buffer memory 14.

On the other hand, because the sending of the audio data over the Internet may be delayed due to a network connection loss on the Internet as stated above, the I-DVD player 100 determines whether the size of audio data temporarily stored in the buffer memory 14 and not reproduced yet is zero or below a predetermined reference value. If the size of the stored audio data is zero or below the predetermined reference value, the I-DVD player 100 automatically changes the current play mode to a Pause On mode, and sets a Pause On hold time by checking information 'EnavTimeOut' indicative of a period of time for which the reproduction operation of the I-DVD should be held in the Pause On mode.

At the time that audio data is normally received over the Internet in the Pause On mode, the I-DVD player 100 automatically changes the current operation mode from the Pause On mode to a Pause Off mode, and thus re-synchronizes and reproduces data read from the I-DVD and the contents information provided from the CP server. On the other hand, if there is no audio data received even after the set Pause On hold time has elapsed, the I-DVD player 100 automatically changes the current operation mode from the Pause On mode to the Pause Off mode to resume the reproduction operation beginning with a paused play position.

Fig. 5 is a flow chart illustrating a procedure of sending

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and receiving data between the interactive optical disc device and the contents provider server in accordance with a sixth embodiment of the present invention. As stated previously, the I-DVD player 100 initializes an Internet connection with the CP server 300, and the CP server 300 performs a corresponding operation.

Thereafter, the I-DVD player 100 generates a command for requesting sending of ENAV contents information, such as audio data corresponding to an A/V stream being currently reproduced, and outputs the generated command to the CP server 300.

In response to the command from the I-DVD player 100, the CP server 300 retrieves the requested audio data from a database and then sends it as ENAV contents information to the I-DVD player 100. At this time, the CP server 300 and the I-DVD player 100 count the number of synchronizations of the audio data sent/received as stated above and manage the counted result as information 'SyncCount'.

The I-DVD player 100 then synchronizes and reproduces the A/V stream and/or contents information read from the I-DVD 10 and the ENAV contents information, or audio data, downloaded from the CP server 300 and temporarily stored in the buffer memory 14.

On the other hand, when the sending of the audio data over the Internet is suspended or delayed due to a network connection loss on the Internet as stated above, the I-DVD player 100 calculates a re-synchronizable predictive synchronization count value 'PredictSyncCount' with reference to a bandwidth of a network bit rate under the condition of maintaining the current play mode as it is.

For example, in the case where a value obtained by counting synchronizations of normally received audio data is 'Sync 6' and the re-synchronizable predictive synchronization count value 'PredictSyncCount' is 'Sync 13', the I-DVD player 100 generates a command for requesting sending of audio data corresponding to

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the count value 'Sync 13', for example, a command 'ReSynchRequest', and then sends the generated command to the CP server 300.

In response to the command 'ReSynchRequest', the CP server 300 seeks a recording position of the audio data corresponding to the count value 'Sync 13', reads the audio data at the sought recording position and sends it to the I-DVD player 100. At this time, the CP server 300 first sends information 'ReSynchACK' for notification of re-sending of the audio data and then sends the audio data sequentially.

Meanwhile, the I-DVD player 100 discards audio data received over the Internet before the information 'ReSynchACK' is received. Therefore, the I-DVD player 100 reproduces the contents information re-sent from the CP server 300 after reception of the information 'ReSynchACK' while re-synchronizing it with data being currently read from the I-DVD 10.

Fig. 6 is a flow chart illustrating a procedure of sending and receiving data between the interactive optical disc device and the contents provider server in accordance with a seventh embodiment of the present invention. As stated previously, the I-DVD player 100 initializes an Internet connection with the CP server 300, and the CP server 300 performs a corresponding operation.

Thereafter, the I-DVD player 100 generates a command for requesting sending of ENAV contents information, such as audio data corresponding to an A/V stream being currently reproduced, and outputs the generated command to the CP server 300.

In response to the command from the I-DVD player 100, the CP server 300 retrieves the requested audio data from a database and then sends it as ENAV contents information to the I-DVD player 100. At this time, the I-DVD player 100 manages an offset of the video data being currently reproduced, as information 'VideoOffset'.

The I-DVD player 100 then synchronizes and reproduces the

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A/V stream and/or contents information read from the I-DVD 10 and the ENAV contents information, or audio data, downloaded from the CP server 300 and temporarily stored in the buffer memory 14.

On the other hand, when the sending of the audio data over the Internet is suspended or delayed due to a network connection loss on the Internet as stated above, the I-DVD player 100, under the condition of maintaining the current play mode as it is, checks the information 'VideoOffset', generates a command for requesting sending of audio data corresponding thereto, for example, a command 'InformVideoOffset', and then sends the generated command to the CP server 300.

Then, in response to the command 'InformVideoOffset', the CP server 300 calculates an audio offset corresponding to the video offset, seeks a recording position corresponding to the calculated audio offset, reads audio data at the sought recording position and sends it to the I-DVD player 100. At this time, the CP server 300 first sends information 'ReSynchACK' for notification of sending of the re-synchronizable audio data and then sends the audio data sequentially.

Meanwhile, the I-DVD player 100 checks information 'ReSyncTime' after receiving the information 'ReSynchACK'. The information 'ReSyncTime' indicates a period of time, for example, 5 seconds, required for re-synchronization between audio data re-sent from the CP server and data from the I-DVD after the information 'ReSynchACK' is received. The I-DVD player 100 discards audio data received for 5 seconds after reception of the information 'ReSynchACK', and thus re-synchronizes and normally outputs audio data received after 5 seconds and data from the I-DVD.

Also, the I-DVD player 100 may send information regarding a storage capacity of the ENAV contents information, for example, audio data, downloaded into the buffer memory 14 to the CP server 300, and the CP server 300 may check the audio data storage

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capacity and variably control a bit rate of audio data being sent to the I-DVD player appropriately according to the checked result.

For example, in the process of initializing the Internet connection between the CP server 300 and the I-DVD player 100, the CP server 300 allocates and sends an Internet protocol (IP) address and port number necessary for the connection to the I-DVD player 100, and the I-DVD player 100 checks the current available buffer size of the buffer memory 14 and sends the resulting information to the CP server 300.

The CP server 300 controls a bit rate of audio data being sent to the I-DVD player 100 appropriately with reference to the buffer size information from the I-DVD player 100 so as to prevent a buffer under-run or overflow of audio data to be stored in the buffer memory.

For reference, the IP address and port number may be sent in the form of a command 'ConnToCtrlServer(char *IP, cha *port)', and the buffer size information may be sent in the form of a command 'SendUsableBuffer'.

Further, in the case where the I-DVD player 100 changes the play mode to the Pause On mode in response to the user's request, it generates a command 'SendPauseOn' for notification of the Pause On mode and sends it to the CP server 300. In the case of changing the Pause On mode to the Pause Off mode, it generates a command 'SendPauseOff' for notification of the Pause Off mode and sends it to the CP server 300.

Therefore, the CP server suspends or resumes the sending of audio data according to the operation mode of the I-DVD player.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. For example, the present invention is

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applicable to rewritable DVDs, such as a DVD-RW and DVD-RAM, or various information storage media, as well as the I-DVD.

As apparent from the above description, the present invention provides a method for reproducing contents information in an interactive optical disc device and a method for providing contents information in a contents provider server, wherein the interactive optical disc device is connected with the contents provider server via the Internet to receive a variety of contents information provided from the contents provider server and, even if the sending of the contents information from the contents provider server to the interactive optical disc device is suspended or delayed, contents information re-sent from the contents provider server and a data stream read from an interactive DVD are re-synchronized and reproduced, so that a user of the interactive optical disc device can normally watch more various contents information.

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CLAIMS

1. A method for reproducing contents information in an interactive optical disc device, comprising the steps of:

a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet;

b) if the sending of said contents information from said contents provider server is suspended or delayed, generating a command for requesting re-sending of specific contents information, based upon information about a size of said downloaded contents information, and sending the generated command to said contents provider server; and

c) reproducing said specific contents information re-sent from said contents provider server in response to said command together with data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

2. The method as set forth in claim 1, wherein said contents information size information is information about an offset of contents information downloaded into a buffer memory of said interactive optical disc device.

3. The method as set forth in claim 2, wherein said specific contents information whose re-sending is requested is contents information subsequent to said offset of said contents information downloaded into said buffer memory.

4. The method as set forth in claim 1, wherein said command for requesting the re-sending of said specific contents

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information includes a parameter, said parameter being the size of said downloaded contents information.

5. The method as set forth in claim 1, wherein said step c) includes the steps of:

c-1) receiving a command for notification of the re-sending of said specific contents information from said contents provider server; and

c-2) after said re-sending notification command is received, reproducing said specific contents information re-sent from said contents provider server together with said data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

6. A method for reproducing contents information in an interactive optical disc device, comprising the steps of:

a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet;

b) if the sending of said contents information from said contents provider server is suspended or delayed, pausing a data reproducing operation of said interactive optical disc for a predetermined period of time and determining whether there is contents information received over said Internet; and

c) if there is contents information received over said Internet, re-synchronizing and reproducing the received contents information and data read from said interactive optical disc.

7. The method as set forth in claim 6, wherein said step b) includes the steps of:

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b-1) if the sending of said contents information from said contents provider server is suspended or delayed, determining whether a size of contents information downloaded into a buffer memory of said interactive optical disc device and not reproduced yet is below a predetermined reference value;

b-2) automatically pausing the data reproducing operation of said interactive optical disc if the size of said contents information downloaded into said buffer memory and not reproduced yet is below said predetermined reference value; and

b-3) determining whether there is contents information received over said Internet.

8. The method as set forth in claim 7, wherein said step c) includes the step of, if a size of contents information received over said Internet, downloaded into said buffer memory and not reproduced yet becomes greater than or equal to said predetermined reference value, automatically re-synchronizing and reproducing the received contents information and said data read from said interactive optical disc.

9. The method as set forth in claim 6, wherein said step c) includes the step of resuming the paused data reproducing operation of said interactive optical disc if there is no contents information received over said Internet even after said predetermined time period has elapsed.

10. The method as set forth in claim 9, wherein the resumed data reproducing operation of said interactive optical disc is performed to reproduce only said data read from said interactive optical disc.

11. A method for reproducing contents information in an interactive optical disc device, comprising the steps of:

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a) synchronizing and reproducing data read from an interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet;

b) if the sending of said contents information from said contents provider server is suspended or delayed, generating a command for requesting re-sending of specific contents information, based upon a counted contents information synchronization value, and sending the generated command to said contents provider server; and

c) reproducing said specific contents information re-sent from said contents provider server in response to said command together with data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

12. The method as set forth in claim 11, wherein said counted contents information synchronization value is a value obtained by counting the number of synchronizations between said data read from said interactive optical disc and said contents information downloaded from said contents provider server.

13. The method as set forth in claim 11, wherein said step b) includes the steps of:

b-1) checking said counted contents information synchronization value if the sending of said contents information from said contents provider server is suspended or delayed;

b-2) calculating a re-synchronizable contents information synchronization value based upon said counted contents information synchronization value; and

b-3) generating a command for requesting re-sending of specific contents information corresponding to the calculated

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synchronization value and sending the generated command to said contents provider server.

14. The method as set forth in claim 13, wherein said command for requesting the re-sending of said specific contents information includes a parameter, said parameter being said re-synchronizable contents information synchronization value.

15. The method as set forth in claim 13, wherein said re-synchronizable contents information synchronization value is calculated with reference to a bandwidth of a current network bit rate.

16. The method as set forth in claim 11, wherein said step c) includes the steps of:

c-1) receiving a command for notification of the re-sending of said specific contents information from said contents provider server; and

c-2) after said re-sending notification command is received, reproducing said specific contents information re-sent from said contents provider server together with said data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

17. The method as set forth in claim 16, wherein contents information received before said command for notification of the re-sending of said specific contents information is received from said contents provider server is discarded.

18. A method for reproducing contents information in an interactive optical disc device, comprising the steps of:

a) synchronizing and reproducing data read from an

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interactive optical disc and contents information sent and downloaded from a contents provider server connected via the Internet;

b) if the sending of said contents information from said contents provider server is suspended or delayed, generating a command for requesting re-sending of specific contents information, based upon offset information of said data read from said interactive optical disc, and sending the generated command to said contents provider server; and

c) after a predetermined period of time has elapsed, reproducing said specific contents information re-sent from said contents provider server in response to said command together with data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

19. The method as set forth in claim 18, wherein said data offset information is playback time information of data read from said interactive optical disc and being currently reproduced in a state of not being synchronized with said downloaded contents information.

20. The method as set forth in claim 18, wherein said command for requesting the re-sending of said specific contents information includes a parameter, said parameter being said offset information.

21. The method as set forth in claim 18, wherein contents information received until said predetermined time period elapses is discarded.

22. The method as set forth in claim 21, wherein said step c) includes the steps of:

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c-1) receiving a command for notification of the re-sending of said specific contents information from said contents provider server;

c-2) reproducing only said data read from said interactive optical disc for said predetermined time period after said re-sending notification command is received; and

c-3) after said predetermined time period has elapsed, reproducing said specific contents information re-sent from said contents provider server together with said data read from said interactive optical disc while re-synchronizing it with said data read from said interactive optical disc.

23. The method as set forth in any one of claims 1, 6, 11 and 18, wherein said contents information sent from said contents provider server is audio data, and said data read from said interactive optical disc includes video data.

24. A method for providing contents information in a contents provider server, comprising the steps of:

a) sequentially sending contents information whose sending is requested by an interactive optical disc device connected via the Internet;

b) if the sending of said requested contents information is suspended or delayed, receiving a command, while including a parameter which is information regarding specific contents information, for requesting re-sending of said specific contents information, from said interactive optical disc device; and

c) re-sending said specific contents information to said interactive optical disc device in response to said command.

25. The method as set forth in claim 24, wherein said sent contents information is audio data to be reproduced synchronously with video data read from an interactive optical

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disc in said interactive optical disc device.

26. The method as set forth in claim 24, wherein said information regarding said specific contents information is any one of information about a size of contents information downloaded by said interactive optical disc device, a synchronization value of contents information to be reproduced re-synchronously with data read from an interactive optical disc, or an offset of data read from said interactive optical disc and to be reproduced while being re-synchronized with said specific contents information requested to be re-sent.

27. The method as set forth in claim 24, wherein said step c) includes the steps of:

c-1) seeking a position of data corresponding to said information regarding said specific contents information;

c-2) sending a command for notification of the re-sending of said specific contents information to said interactive optical disc device; and

c-3) reading said specific contents information at said position and re-sending it to said interactive optical disc device.

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FIG. 1

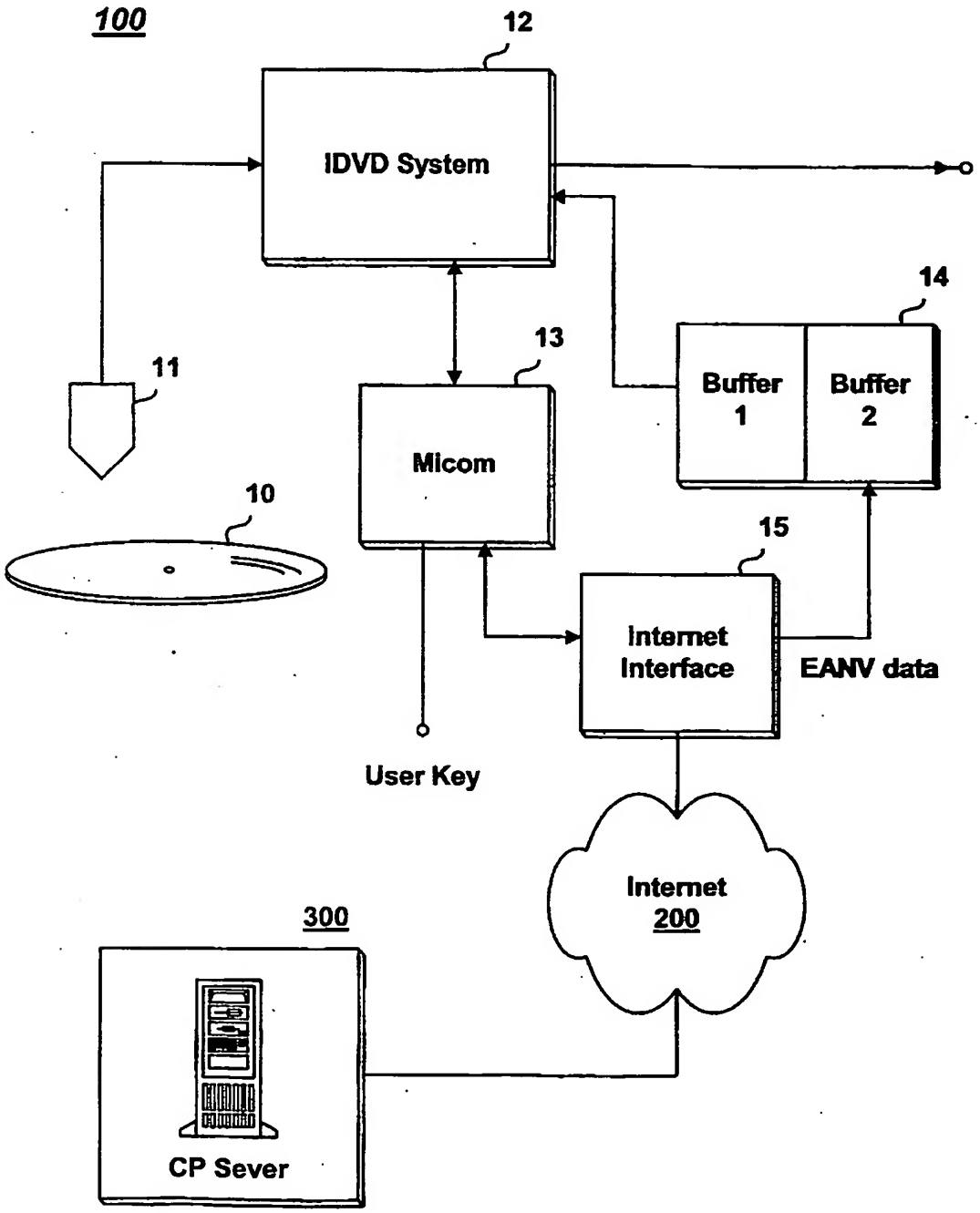

100
12
IDVD System
14
13
11
Buffer 1
Buffer 2
Micom
10
15
Internet Interface
EANV data
User Key
Internet 200
300
CP Sever

FIG. 2

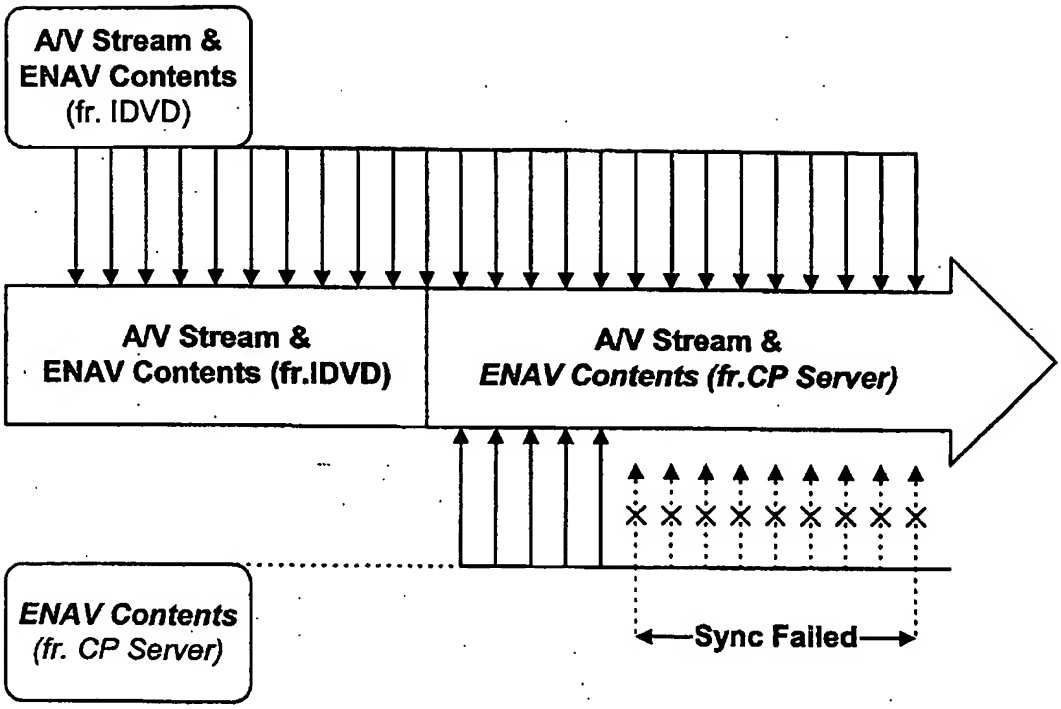

A/V Stream &
ENAV Contents
(fr. IDVD)
A/V Stream &
ENAV Contents (fr.IDVD)
A/V Stream &
ENAV Contents (fr.CP Server)
ENAV Contents
(fr. CP Server)
Sync Failed

FIG. 3

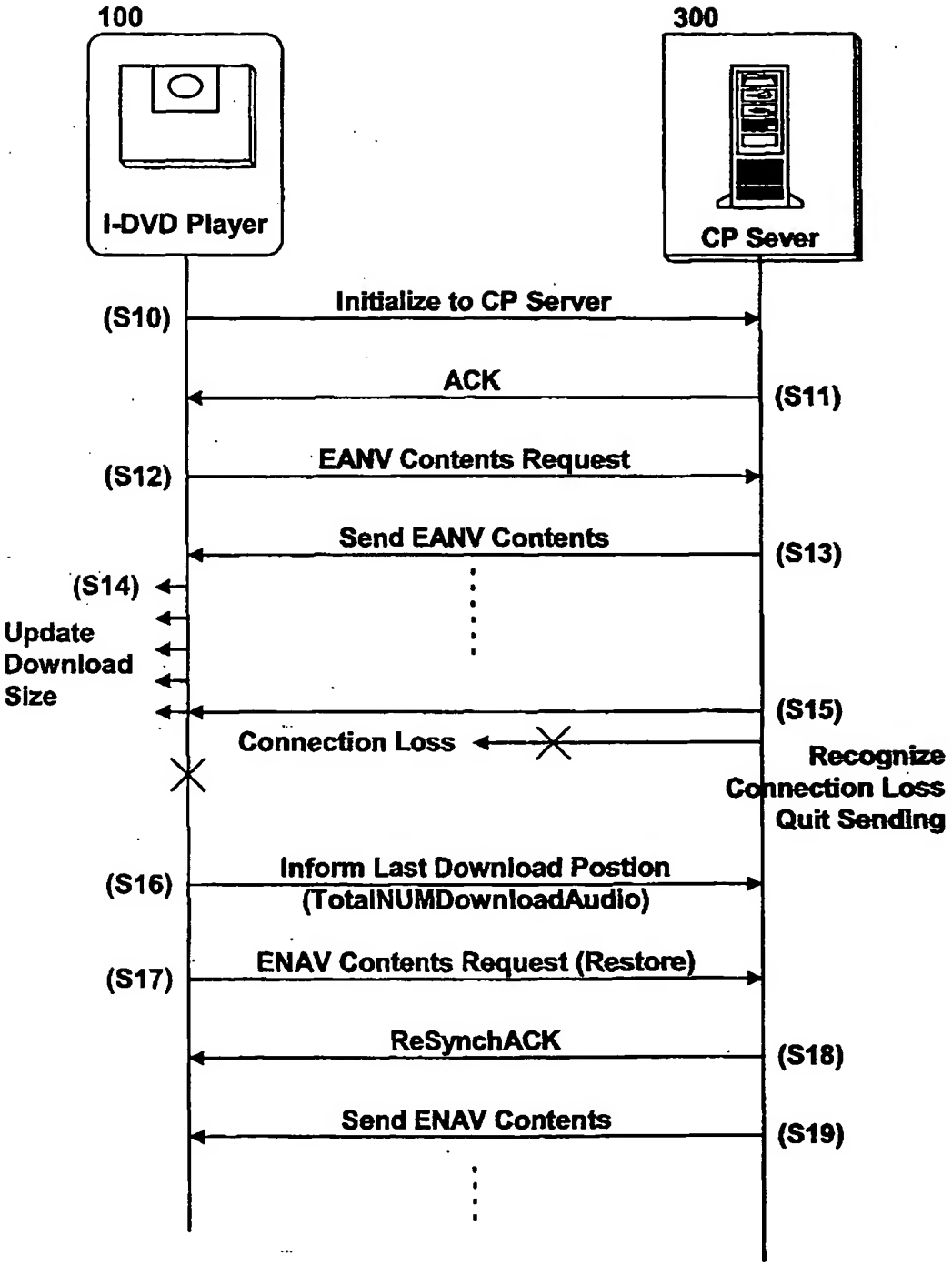

100
300
I-DVD Player
CP Sever
(S10)
Initialize to CP Server
ACK
(S11)
(S12)
EANV Contents Request
Send EANV Contents
(S13)
(S14)
Update
Download
Size
(S15)
Connection Loss
Recognize
Connection Loss
Quit Sending
(S16)
Inform Last Download Postion
(TotalNUMDownloadAudio)
(S17)
ENAV Contents Request (Restore)
ReSynchACK
(S18)
Send ENAV Contents
(S19)

FIG. 4

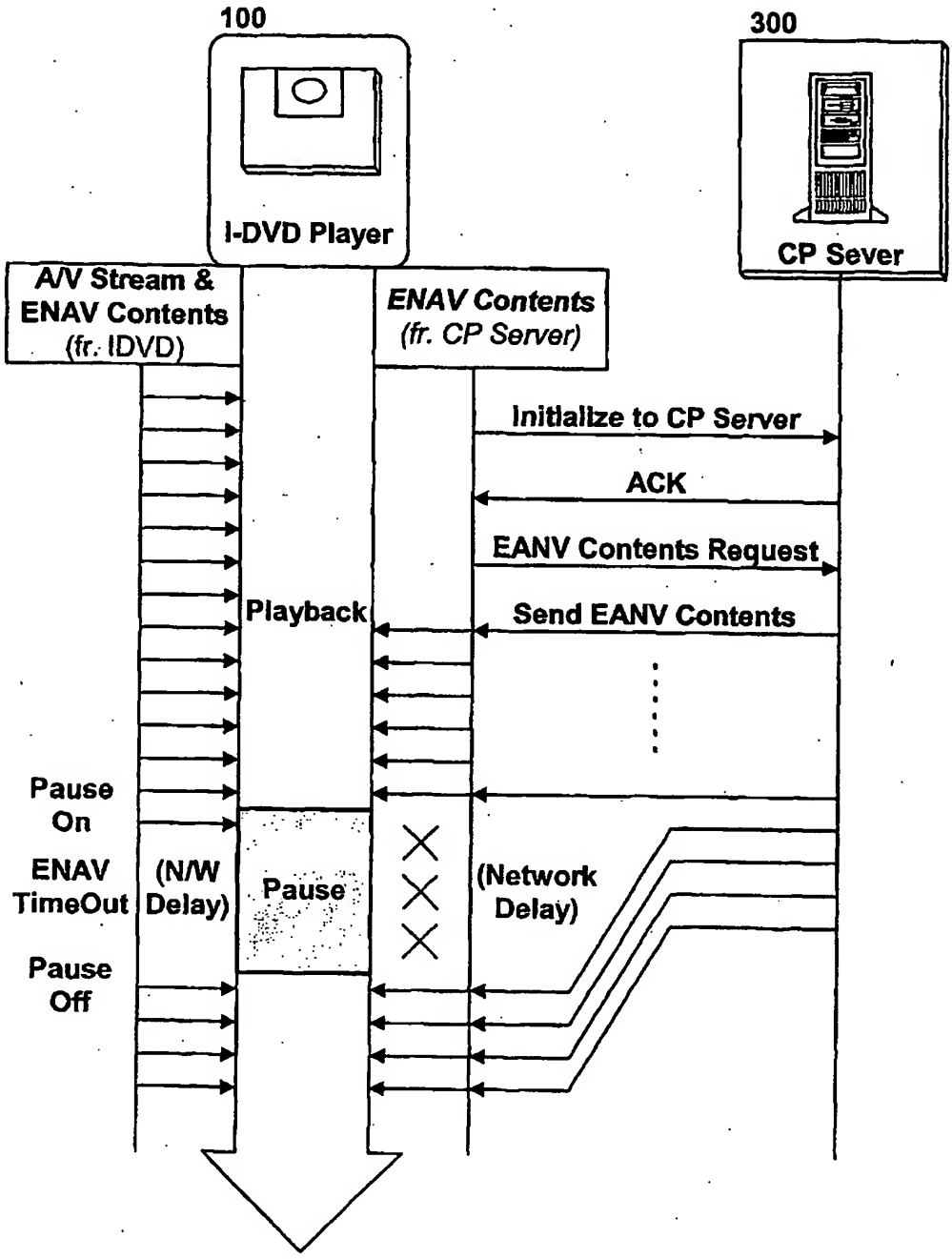

100
300
I-DVD Player
CP Sever
A/V Stream & ENAV Contents (fr. IDVD)
ENAV Contents (fr. CP Server)
Initialize to CP Server
ACK
EANV Contents Request
Send EANV Contents
Playback
Pause On
ENAV TimeOut
(N/W Delay)
Pause
(Network Delay)
Pause Off

FIG. 5

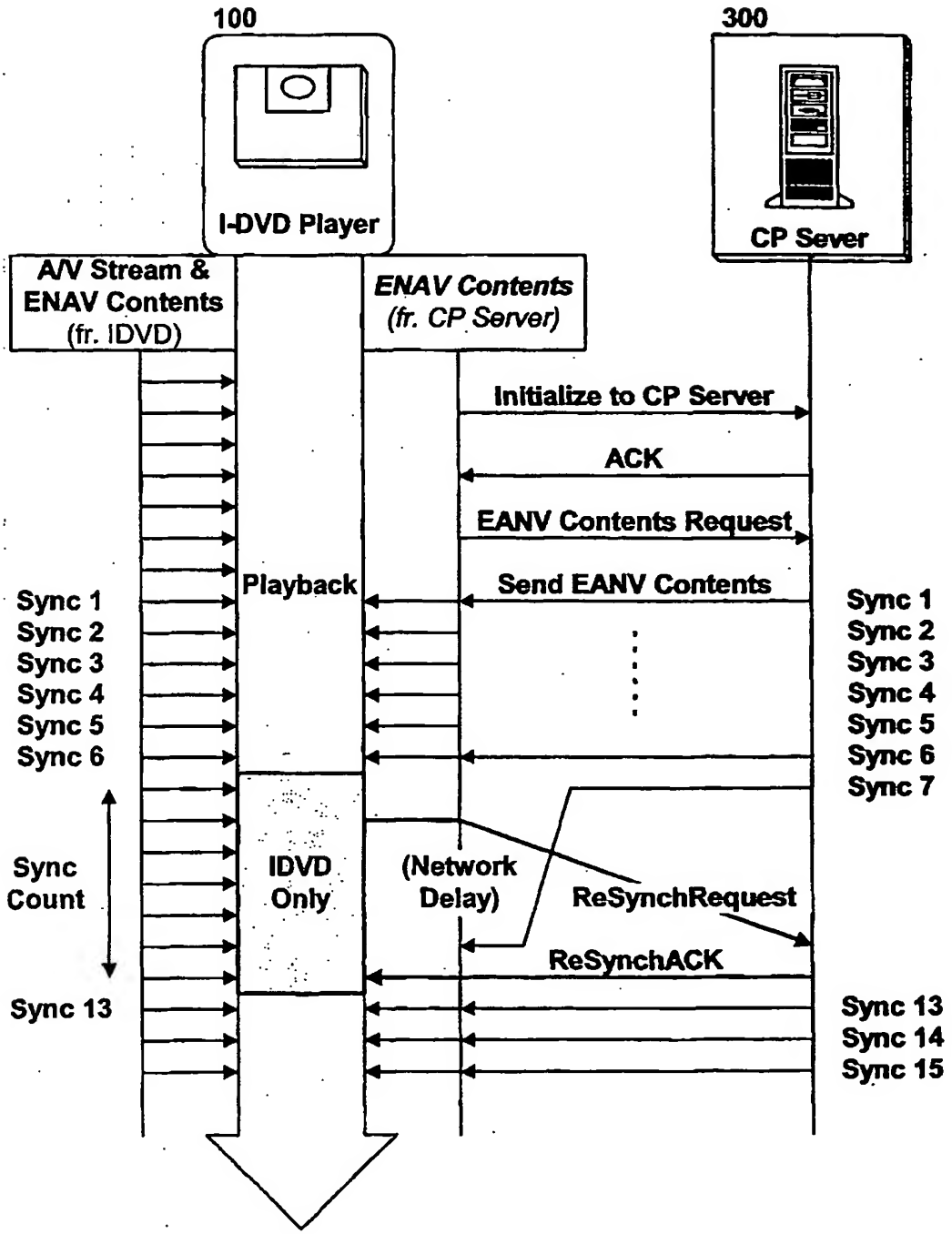
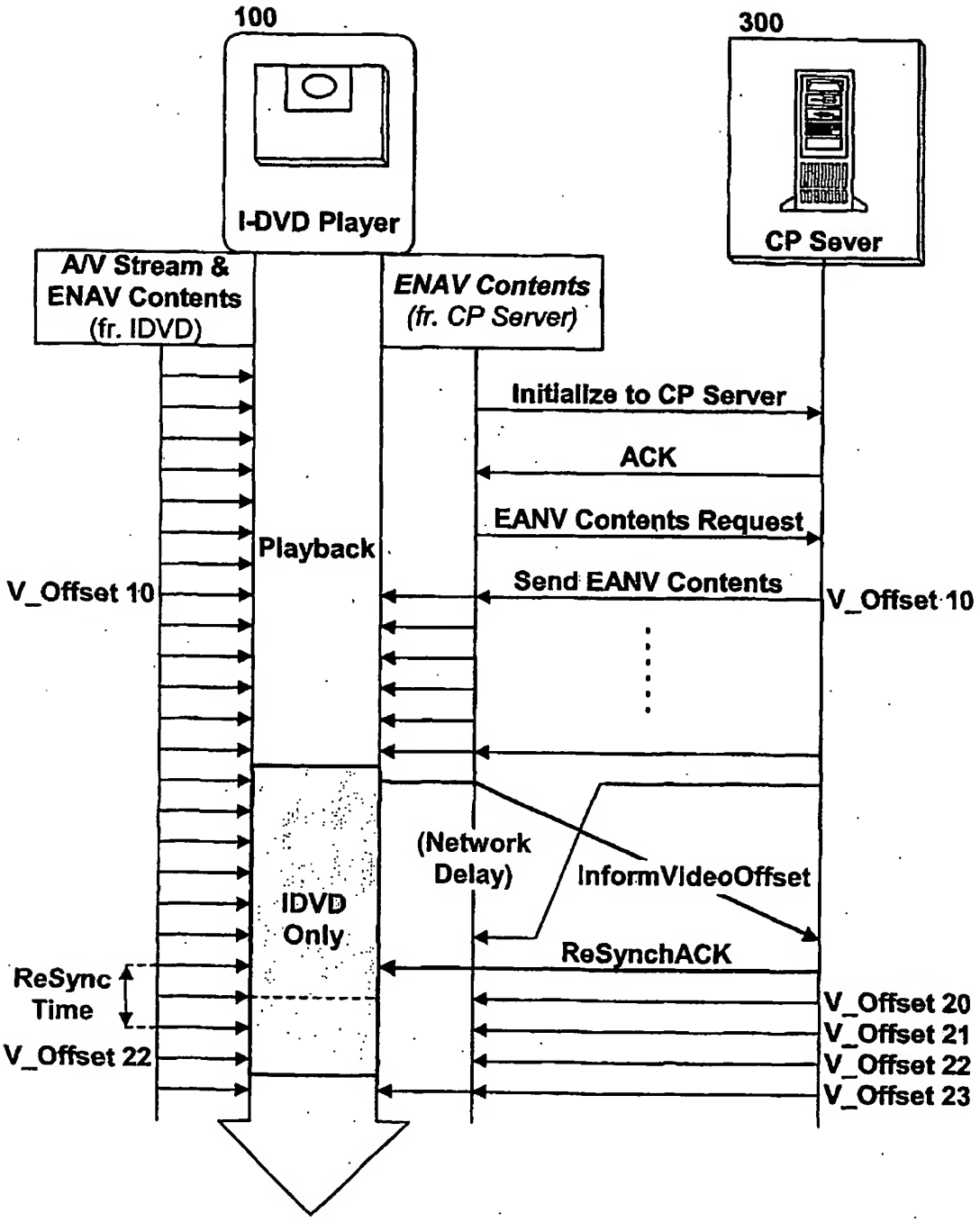

100
300
I-DVD Player
CP Sever
A/V Stream & ENAV Contents (fr. IDVD)
ENAV Contents (fr. CP Server)
Initialize to CP Server
ACK
EANV Contents Request
Send EANV Contents
Playback
Sync 1
Sync 2
Sync 3
Sync 4
Sync 5
Sync 6
Sync 7
Sync Count
IDVD Only
(Network Delay)
ReSynchRequest
ReSynchACK
Sync 13
Sync 14
Sync 15

FIG. 6


100
300
I-DVD Player
CP Sever
A/V Stream & ENAV Contents (fr. IDVD)
ENAV Contents (fr. CP Server)
Initialize to CP Server
ACK
EANV Contents Request
Playback
Send EANV Contents
V_Offset 10
V_Offset 10
(Network Delay)
InformVideoOffset
IDVD Only
ReSynchACK
ReSync Time
V_Offset 20
V_Offset 21
V_Offset 22
V_Offset 22
V_Offset 23

INTERNATIONAL SEARCH REPORT

ernational application No.
PCT/KR2003/002255

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G06F 15/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC7 G06F 15/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean patents and applications for inventions since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 2001-85515 A (SONY INC.) 7 SEP. 2001 SEE THE WHOLE DOCUMENTS	1-27
A	KR 2001-113441 A (SAMSUNG INC.) 28 DEC. 2001 SEE THE WHOLE DOCUMENTS	1-27
A	KR 2000-69008 A (MATSUSHITA DENKI INC.) 25 NOV. 2000 SEE THE WHOLE DOCUMENTS	1-27
A	KR 97-703667 A (UNISYS INC.) 3 JUL. 1997 SEE THE WHOLE DOCUMENTS	1-27

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 FEBRUARY 2004 (16.02.2004)	17 FEBRUARY 2004 (17.02.2004)

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